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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/811,653	03/19/2001	Dietrich Klakow	DE00046	7775

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PHILIPS INTELLECTUAL PROPERTY & STANDARDS
P.O. BOX 3001
BRIARCLIFF MANOR, NY 10510

EXAMINER	
LERNER, MARTIN	
ART UNIT	**PAPER NUMBER**
2654	4

DATE MAILED: 08/26/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/811,653	KLAKOW ET AL.	
	Examiner	Art Unit	
	Martin Lerner	2654	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1 to 10 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1 to 9 is/are rejected.

7)☒ Claim(s) 10 is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

On page 2, lines 3 to 4, the reference to claims 2 to 7 should be deleted. The final numbering of the claims may not reflect the subject matter cited with respect to these claims, so reference to any claims should be avoided in the Specification.

The arrangement of the Specification does not include headings as is conventional in patent practice in the United States.

Appropriate correction is required.

Claim Objections

2. Claim 6 is objected to because of the following informalities:

The claim would be clearer if the abbreviation "OOV" is spelled out in the claim, as "out of vocabulary".

Appropriate correction is required.

3. Claim 10 is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend upon another multiple dependent claim. See MPEP § 608.01(n). Accordingly, claim 10 has not been further treated on the merits.

Claim Rejections - 35 USC § 112

4. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

5. Claim 6 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 6, the phrase "especially when" renders the claim indefinite because it is unclear whether the limitation following the phrase is part of the claimed invention. See MPEP § 2173.05(d).

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

7. Claims 1 to 6 and 8 are rejected under 35 U.S.C. 102(a) as being clearly anticipated by *Klakow ("Selecting articles from the language model training corpus")*.

8. Applicants cannot rely upon the foreign priority papers to overcome this rejection because a translation of said papers has not been made of record in accordance with 37 CFR 1.55. See MPEP § 201.15.

9. Claims 7 and 9 are rejected under 35 U.S.C. 102(e) as being anticipated by *Ramaswamy et al.*

Regarding independent claim 7, *Ramaswamy et al.* discloses a method of building language models for speech recognition, characterized in that:

"a text corpus part of a given first text corpus is gradually extended by one or various other text corpus parts of the first text corpus in dependence on text data of an application-specific text corpus to form a second text corpus and in that the values of the language model are generated while the second text corpus is used" – language model constructor 50 reads linguistic units from seed corpus 10 and constructs an initial reference language model 80 from these linguistic units; once an initial reference language model 80 ("a first text corpus") is constructed, iterative corpus extractor 60 reads linguistic units ("one or various text corpus parts") from external corpus 20 and computes a relevance score for each linguistic unit in accordance with language model 80; an iterative language model building technique generates a final language model 90 ("a second text corpus") from a small, domain-restricted seed corpus 15 ("in dependent on text data of an application-specific text corpus") and a large, less restricted external corpus 20; the linguistic units in seed corpus 15 are all highly relevant to a common domain or field ("an application-specific text corpus"), and external corpus 20 contains text data that is less relevant to the domain of interest than the data within the seed corpus; final language model 90 is used in language processing applications (column 2, line 40 to column 3, line 63: Figures 1 and 2).

Regarding independent claim 9, *Ramaswamy et al.* discloses a method of building language models for speech recognition, characterized in that:

"a part of a given acoustic training material, which represents a multitude of speech utterances, is gradually extended by one or more parts of the given acoustic training material and in that the acoustic references of the acoustic model are formed by means of the accumulated parts of the given acoustic training material" – language model constructor 50 reads linguistic units ("one or more parts of the given acoustic training material") from seed corpus 10 and constructs an initial reference language model 80 from these linguistic units; once an initial reference language model 80 is constructed, iterative corpus extractor 60 reads linguistic units from external corpus 20 and computes a relevance score for each linguistic unit in accordance with language model 80, and incrementally increases the size of the initial reference language model 80 ("is gradually extended by one or more parts of the given acoustic training material"); an iterative language model building technique generates a final language model 90 ("the acoustic model") from a small, domain-restricted seed corpus 15 and a large, less restricted external corpus 20; the linguistic units in seed corpus 15 are all highly relevant to a common domain or field, and external corpus 20 contains text data that is less relevant to the domain of interest than the data within the seed corpus; final language model 90 is used in language processing applications (column 2, line 40 to column 4, line 7: Figures 1 and 2); implicitly, linguistic units are acoustic units in speech recognition.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1, 2, 5/1, 5/2, 6/5/1, 6/5/2, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Ramaswamy et al.* in view of *Bandara et al.*

Regarding independent claim 1, *Ramaswamy et al.* discloses a method of generating a language model for speech recognition, characterized:

"in that a first text corpus is gradually [reduced] by one or more various text corpus parts in dependence on text data of an application-specific second text corpus" – language model constructor 50 reads linguistic units from seed corpus 10 and constructs an initial reference language model 80 from these linguistic units; once an initial reference language model 80 ("a first text corpus") is constructed, iterative corpus extractor 60 reads linguistic units ("one or various text corpus parts") from external corpus 20 and computes a relevance score for each linguistic unit in accordance with language model 80; an iterative language model building technique generates a final language model 90 from a small, domain-restricted seed corpus 15 ("in dependence on text data of an application-specific second text corpus") and a large, less restricted external corpus 20; the linguistic units in seed corpus 15 ("an application-specific second text corpus") are all highly relevant to a common domain or field, and external

corpus 20 contains text data that is less relevant to the domain of interest than the data within the seed corpus (column 2, line 40 to column 3, line 63: Figures 1 and 2);

"in that the values of the language model are generated on the basis of the [reduced] first text corpus" – final language model 90 is used in language processing applications (column 2, line 40 to column 3, line 63: Figures 1 and 2).

Regarding independent claim 1, *Ramaswamy et al.* discloses a method of building language models by iteratively increasing the size of a language model by adding units from a large external text corpus, where the added units are similar to linguistic units in a seed corpus. Thus, *Ramaswamy et al.* discloses gradually increasing the size of the language model but omits gradually reducing the size of the language model. Still, one of ordinary skill in the art would recognize that the language model building method of *Ramaswamy et al.* may be reversed in order gradually to reduce the size of the language model instead of gradually increasing its size. That is, the large external text corpus 20 may be gradually reduced when linguistic units iteratively are compared to, and found to be different from, those in the seed corpus. *Bandara et al.* teaches a method for adapting the size of a language model in a speech recognition system, where an acoustic distance is calculated, and the contents of the language model are reduced with respect to acoustic distance. (Column 5, Lines 20 to 63: Figure 2) The stated advantage is the size of the language model is reduced, while retaining accuracy. (Column 3, Line 56 to Column 4, Line 24) It would have been obvious to one having ordinary skill in the art to reverse the language model building

process of *Ramaswamy et al.* as suggested by *Bandara et al.* for the purpose of reducing the size of the language model, while retaining recognition accuracy.

Regarding claim 2, *Bandara et al.* discloses calculating the language model parameters based upon trigram, bigram, and unigram probabilities (column 2, lines 20 to 67).

Regarding claim 5/1 and 5/2, *Ramaswamy et al.* discloses a test corpus ("test text") is used by model checker 70 to evaluate the language model quality, calling for further language building iterations, if necessary, until its quality is satisfactory (column 3, lines 6 to 14; column 3, line 64 to column 4, line 7).

Regarding claim 6/5/1 and 6/5/2, *Ramaswamy et al.* discloses iterative corpus extractor computes a relevance score based upon a perplexity measure relative to a threshold to determine how many linguistic units to add to the language model (column 4, lines 7 to 54).

Regarding independent claim 8, *Ramaswamy et al.* discloses a method of generating a language model for speech recognition, characterized:

"in that acoustic training material representing a first number of speech utterances is gradually [reduced] by training material parts representing individual speech utterances in dependence on a second number of application-specific speech utterances" – language model constructor 50 reads linguistic units ("training material representing a number of speech utterances") from seed corpus 10 and constructs an initial reference language model 80 from these linguistic units; once an initial reference language model 80 ("a first number of speech utterances") is constructed, iterative

corpus extractor 60 reads linguistic units from external corpus 20 and computes a relevance score for each linguistic unit in accordance with language model 80, and incrementally increases the size of the initial reference language model 80; an iterative language model building technique generates a final language model 90 from a small, domain-restricted seed corpus 15 ("in dependence on a second number of application-specific speech utterances") and a large, less restricted external corpus 20; the linguistic units in seed corpus 15 are all highly relevant to a common domain or field, and external corpus 20 contains text data that is less relevant to the domain of interest than the data within the seed corpus (column 2, line 40 to column 4, line 7: Figures 1 and 2); implicitly, linguistic units are acoustic units in speech recognition;

"in that the acoustic references of the acoustic model are formed by means of the [reduced] acoustic training material" – final language model 90 is used in language processing applications (column 2, line 40 to column 3, line 63: Figures 1 and 2).

Regarding independent claim 8, *Ramaswamy et al.* discloses a method of building language models by iteratively increasing the size of a language model by adding units from a large external text corpus, where the added units are similar to linguistic units in a seed corpus. Thus, *Ramaswamy et al.* discloses gradually increasing the size of the language model but omits gradually reducing the size of the language model. Still, one of ordinary skill in the art would recognize that the language model building method of *Ramaswamy et al.* may be reversed in order gradually to reduce the size of the language model instead of gradually increasing its size. That is, the large external text corpus 20 may be gradually reduced when linguistic units

iteratively are compared to, and found to be different from, those in the seed corpus. *Bandara et al.* teaches a method for adapting the size of a language model in a speech recognition system, where an acoustic distance is calculated, and the contents of the language model are reduced with respect to acoustic distance. (Column 5, Lines 20 to 63: Figure 2) The stated advantage is the size of the language model is reduced, while retaining accuracy. (Column 3, Line 56 to Column 4, Line 24) It would have been obvious to one having ordinary skill in the art to reverse the language model building process of *Ramaswamy et al.* as suggested by *Bandara et al.* for the purpose of reducing the size of the language model, while retaining recognition accuracy.

12. Claims 3, 4, 5/3, 5/4, 6/5/3, and 6/5/4 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Ramaswamy et al.* in view of *Bandara et al.* as applied to claims 1 and 2 above, and further in view of *Klakow ("Language-model optimization by mapping of corpora")*.

Concerning claim 3, *Ramaswamy et al.* discloses calculating a relevance score, but omits a selection criteria of the equation. However, *Klakow ("Language-model optimization by mapping of corpora")* discloses mapping of training corpora by an n-gram perplexity criterion involving the equation. (Page 702, Left Column) This is stated to have the advantage of reduced perplexity for speech recognition applications. (Page 701) It would have been obvious to one having ordinary skill in the art to apply the equation taught by *Klakow ("Language-model optimization by mapping of corpora")* as

the relevance score of *Ramaswamy et al.* for the purpose of reducing perplexity in speech recognition applications.

Concerning claim 4, *Bandara et al.* discloses calculating the language model parameters based upon trigram, bigram, and unigram probabilities (column 2, lines 20 to 67).

Concerning claim 5/3 and 5/4, *Ramaswamy et al.* discloses a test corpus ("test text") is used by model checker 70 to evaluate the language model quality, calling for further language building iterations, if necessary, until its quality is satisfactory (column 3, lines 6 to 14; column 3, line 64 to column 4, line 7).

Concerning claim 6/5/3 and 6/5/4, *Ramaswamy et al.* discloses iterative corpus extractor computes a relevance score based upon a perplexity measure relative to a threshold to determine how many linguistic units to add to the language model (column 4, lines 7 to 54).

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to Applicants' disclosure.

Bellegarda discloses related art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin Lerner whose telephone number is (703) 308-9064. The examiner can normally be reached on 8:30 AM to 6:00 PM Monday to Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richemond Dorvil can be reached on (703) 305-9645. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4700.

ml
8/19/03

Richemond Dorvil
Primary Examiner